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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/019,882	04/15/2002	Yan Yonghong	42390.P8351	8063

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EXAMINER

WOZNAK, JAMES S

ART UNIT	PAPER NUMBER
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2626

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/019,882

Applicant(s)

YONGHONG, YAN

Examiner

James S. Wozniak

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5,8-11,13,15-18,20,22-26,28 and 30 is/are rejected.
- 7) ☒ Claim(s) 4,6,12,14,19,21,27 and 29 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 April 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. In response to the office action from 1/23/2007, the applicant has submitted an a request for continued examination, filed 1/29/2007, amending independent claims 1 and 16, while arguing to traverse the art rejection based on the limitation regarding the identification of errors in the recognition of utterances based on a reference string (*Amendment, Pages 8-12*). The applicant's arguments have been fully considered but are moot with respect to the new grounds of rejection in view of Nguyen et al (*U.S. Patent: 6,272,462*).

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. **Claims 1-30** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1, 8, 16, and 23 are drawn to methods for speaker independent model conversion. In order for a claimed invention to be considered statutory under 35 U.S.C. 101, it must be useful and accomplish a practical application. That is, it must produce a “useful, concrete and tangible result” (*State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02*). In the present case, the final result of Claims 1, 8, 16, and 23 only refer to an abstract speaker dependent model and not the

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actual tangible result of applying a speaker dependent model to a recognition mode (*see specification, Page 7*). As such, claims 1, 8, 16, and 23 are directed to non-statutory subject matter. The dependent claims fail to overcome the 35 U.S.C. 101 rejection directed towards independent claims 1, 8, 16, and 23, and thus, are also directed to non-statutory subject matter.

Claims 16 and 23 are drawn to a “instructions” *per se*, stored on a “storage medium”, as recited in the preamble and as such represent non-statutory subject matter. See MPEP § 2106.IV.B.1.a.

Data structures not claimed as embodied in computer readable media are descriptive material *per se* and are not statutory because they are not capable of causing functional change in the computer. See, e.g., *Warmerdam*, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure *per se* held nonstatutory). Such claimed data structures do not define any structural and functional interrelationships between the data structure and other claimed aspects of the invention, which permit the data structure's functionality to be realized. In contrast, a claimed computer readable medium encoded with a computer program defines structural and functional interrelationships between the data structure and the computer software and hardware components which permit the data structure's functionality to be realized, and is thus statutory.

Similarly, computer programs claimed as computer listings *per se*, i.e., the descriptions or expressions of the programs are not physical “things.” They are neither computer components nor statutory processes, as they are not “acts” being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer, which permit the computer program's functionality to be realized. Thus, claims 16 and 23 contain non-statutory subject matter.

Although the process in **claims 1 and 8** is directed to a seemingly statutory process, featuring adaptation steps identical to those respectively recited in claims 16 and 23, these claims are directed towards non-functional descriptive material (i.e., description of program steps) as respectively evidenced by Claims 16 and 23. Claims 16 and 23 indicate that the adaptation steps are part of a computer program. In claims 1 and 8, the data structure steps are not encoded on a computer readable medium that enables the data structure's functionality to be realized when executed by a computer (*see above*). Thus, claims 1 and 8 are directed to non-statutory subject matter, for the same reasons as claims 16 and 23.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. **Claims 1-3, 7-11, and 15** are rejected under 35 U.S.C. 102(e) as being anticipated by Nguyen et al (*U.S. Patent: 6,272,462*).

With respect to **Claim 1**, Nguyen discloses:

Calculating estimated weights for identified errors in recognition of utterances based on a reference string (*calculating negative weights for misrecognitions based on an expected transcription sequence, Col. 3, Lines 1-47*);

Marking sections of the utterances as being misrecognized and associating the estimated weights with the sections of the utterances (identifying correct segments and associating positive weights and identifying misrecognized segments and associating negative weights, Col. 3, Lines 1-56); and

Using the weighted sections of the utterances to convert a speaker independent model to a speaker dependent model (*using weights for adaptation of a speaker independent model, Col. 2, Lines 44-55; and Col. 3, Lines 48-56*).

With respect to **Claim 2**, Nguyen further discloses:

The method steps (a)-(c) are repeated at least once (*iterative processing, Col. 3, Lines 43-60*).

With respect to **Claim 3**, Nguyen further discloses:

The utterances are converted into a recognized phone string a first time through applying the speaker independent model and thereafter through applying the most recently obtained speaker dependent model (*initial speaker independent model format, Col. 2, Lines 44-55; and adapted speaker model utilized in iterative processing, Col. 4, Lines 43-60*).

With respect to **Claim 7**, Nguyen further discloses:

Different misrecognized words have different weights (*negative weighting utilizing a variable likelihood score, Col. 3, Lines 1-47*).

With respect to **Claim 8**, Nguyen discloses:

Recognizing utterances through converting the utterances into a recognized string (*recognizing speech and generating transcriptions corresponding to the input speech, Col. 2, Line 56- Col. 3, Line 56*);

Comparing the recognized string with a reference string to determine errors (aligning input speech transcriptions to expected transcriptions to determine recognition errors, Col. 3, Lines 1-56);

Calculating estimated weights for identified errors in recognition of utterances based on a reference string (*calculating negative weights for misrecognitions based on an expected transcription sequence, Col. 3, Lines 1-47*);

Marking sections of the utterances as being misrecognized and associating the estimated weights with the sections of the utterances (identifying correct segments and associating positive weights and identifying misrecognized segments and associating negative weights, Col. 3, Lines 1-56); and

Using the weighted sections of the utterances to convert a speaker independent model to a speaker dependent model (*using weights for adaptation of a speaker independent model, Col. 2, Lines 44-55; and Col. 3, Lines 48-56*).

With respect to **Claim 9**, Nguyen discloses:

The utterances are converted into the recognized string through applying the speaker independent model (*initial speaker independent model, Col. 2, Lines 44-55*).

With respect to **Claim 10**, Nguyen discloses:

Parts (b)-(e) are repeated until differences between the reference and recognized strings are less than a threshold (*repeating iterations until a convergence threshold is reached, Col. 4, Lines 43-60*).

Claim 11 contains subject matter similar to Claim 3, and thus, is rejected for the same reasons.

Claim 15 contains subject matter similar to Claim 7, and thus, is rejected for the same reasons.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 5, 13, 16-18, 20, 22-26, 28, and 30** are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al in view of Junqua (*U.S. Patent: 6,253,181*).

With respect to **Claims 5 and 13**, Nguyen discloses the method for speaker adaptation utilizing a weighting scheme for misrecognitions based on a likelihood score, as applied to Claims 1 and 8. Nguyen does not specifically disclose that calculation of a weighting score that computes an average likelihood difference per frame, however Junqua discloses a calculation of a likelihood difference used in determining a speaker adaptation that utilizes an average of likelihood difference scores associated with an incorrect recognition (*Col. 4, Lines 9-24; and Col. 5, Lines 15-67*). Junqua further discloses an equation similar to that recited in claim 5 for determining a log-likelihood difference in a speaker adaptation process that utilizes an average of likelihood scores (*Col. 5, Lines 15-67; and Col. 4, Lines 9-24*).

Nguyen and Junqua are analogous art because they are from a similar field of endeavor in speaker adaptation systems. Thus, it would have been obvious to a person of ordinary skill in the

art, at the time of invention, to modify the teachings of Goronzy with the likelihood difference calculation taught by Junqua in order to implement a high speed speaker adaptation system that is capable of providing a measure of recognition reliability (*Junqua*, Col. 3, Lines 29-31; and Col.4, Lines 9-24).

With respect to **Claims 16 and 23**, Nguyen teaches the speaker adaptation system that utilizes weighted adaptation, as applied to claims 1 and 8. Goronzy does not specifically suggest method implementation as a program stored on a memory medium, however Junqua discloses a speaker adaptation method implemented using a processor and associated memory that provides the benefit of implementing a practical speaker adaptation process in a hardware system (*Col. 7, Lines 10-14*).

Claims 17-18, 20 and 22 contain subject matter similar to claims 2-3, 5, and 7, and thus, are rejected for the same reasons.

Claims 24-26, 28 and 30 contain subject matter similar to claims 9-11, 13 and 15, and thus, are rejected for the same reasons.

Allowable Subject Matter

8. **Claims 4, 6, 12, 14, 19, 21, 27, and 29** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter:

With respect to **Claims 4, 12, 19, and 27**, the prior art of record fails to explicitly teach or fairly suggest a method for speaker adaptation that utilizes estimated weights based on misrecognized speech utterances as respectively recited in claims 1, 8, 16, and 23, wherein the estimated weights are calculated by computing an average likelihood difference per frame and then computing a weight value by averaging the average likelihood difference over error words (specification, page 6).

Although Junqua (*U.S. Patent: 6,253,181*) teaches an equation for calculating an average likelihood difference, as applied to claim 5, Junqua does not teach averaging the average likelihood difference over all error words to determine a weight for speaker adaptation of a speech recognition model.

With respect to **Claims 6, 14, 21, and 29**, the prior art of record fails to explicitly teach or fairly suggest a method for speaker adaptation that utilizes estimated weights based on misrecognized speech utterances, wherein the estimated weights are calculated by multiplying an average likelihood difference per frame calculated using the equation recited in claims 5, 13, 20, and 28 by the inverse of a number of misrecognized words for a particular speaker as per the equation recited in claims 6, 14, 21, and 29.

Although Junqua (*U.S. Patent: 6,253,181*) teaches an equation for calculating an average likelihood difference, Junqua does not teach multiplying the calculated average likelihood by the inverse of a number of misrecognized words for a particular speaker as per the equation recited in claims 6, 14, 21, and 29.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Bahl et al (*U.S. Patent: 4,827,521*)- discloses a method for speech recognition model adaptation utilizing incorrect recognitions.

Ballard et al (*U.S. Patent: 6,195,637*)- discloses a method for marking speech recognition errors.

Yu et al (*"Corrective Training for Speaker Adaptation," 1999*)- discloses a method that uses corrective training techniques for rapid acoustic speaker adaptation.

Nguyen et al (*"N-best Based Supervised and Unsupervised Adaptation for Native and Non-Native Speakers in Cars," 1999*)- discloses a set of techniques for corrective speaker adaptation.


11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (571) 272-7632. The examiner can normally be reached on M-Th, 7:30-5:00, F, 7:30-4, Off Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached at (571) 272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James S. Wozniak
3/8/2007



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